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14. ABSTRACT

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MEMORANDUM FOR PRS (In-House Publication)

FROM: PROI (STINFO)

22 March 2002

SUBJECT: Authorization for Release of Technical Information, Control Number: AFRL-PR-ED-VG-2002-067
T.W. Hawkins (PRSP), "HEDM Monopropellant Development"

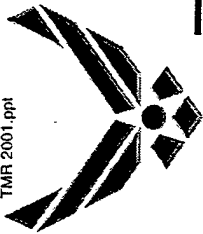
55449

Chief Scientist Tour

(Statement A)

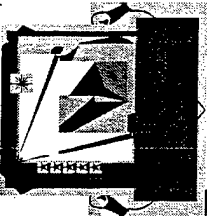
(Edwards AFB, CA, 07 March 2002) (Deadline: Past Due)

1. This document is...



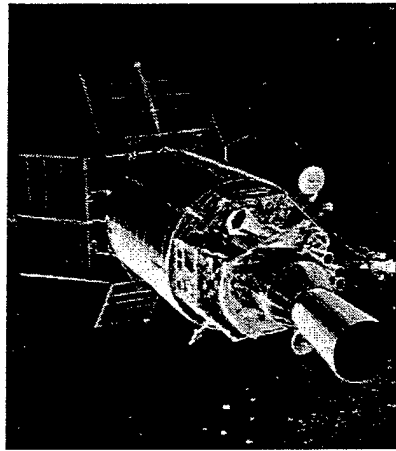
HEDM- Advanced Monopropellants

B2650.

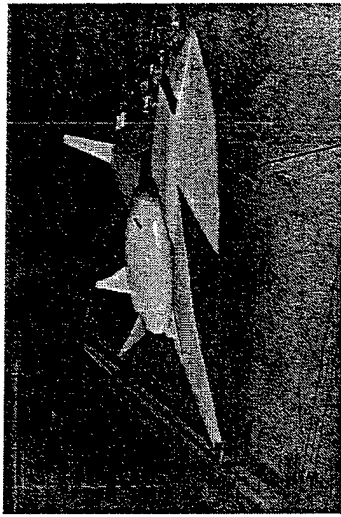


**Monopropellant Development
for Next-Generation
IHPRPT Thruster**

**Monopropellant Feasibility for
Emergency Power Units
(F-16/U-2 SPOs)**



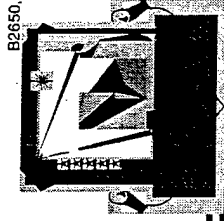
HEDM 6.2 Projects



**Advanced Monopropellant for
Large Engines
(NASA MSFC)**



AF-M315 in Next Generation Spacecraft Thruster

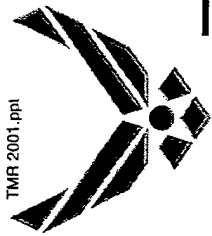


- Advanced thruster for monopropellant (AF-M315)

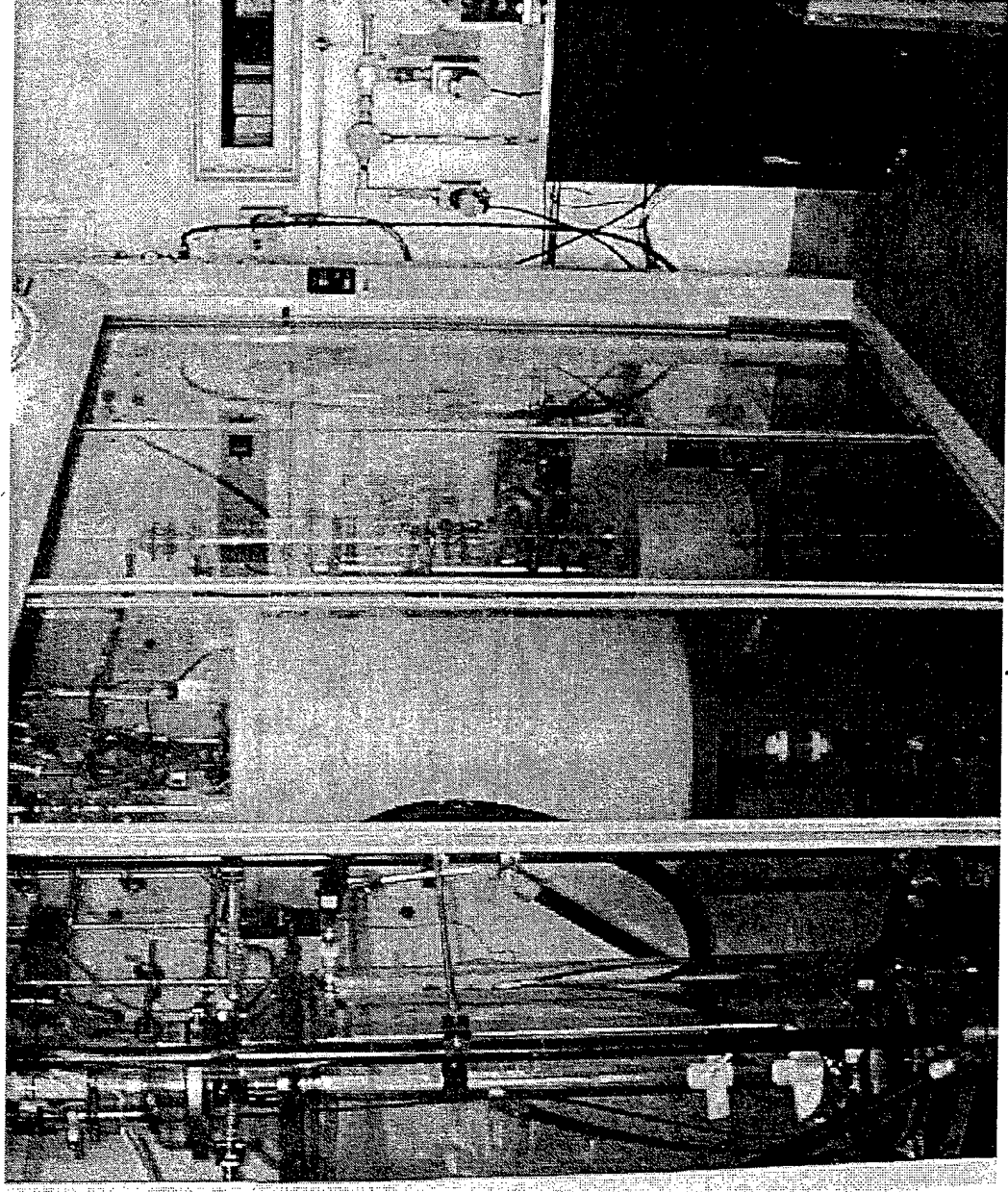
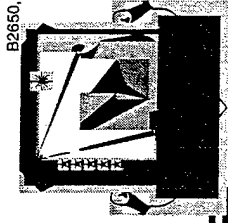
First USAF monopropellant accepted into CPIA Liquid Propulsion Manual

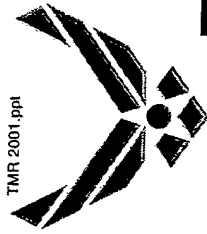
High Performance Capability!

- Propellant downselected for Advanced Thruster Program



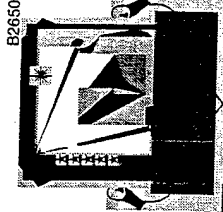
Grand Opening of the Area 1-30 Pilot Facility at Test Cell 27 March 4, 2002



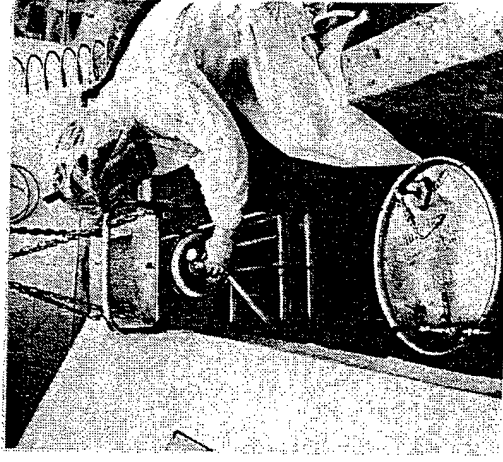
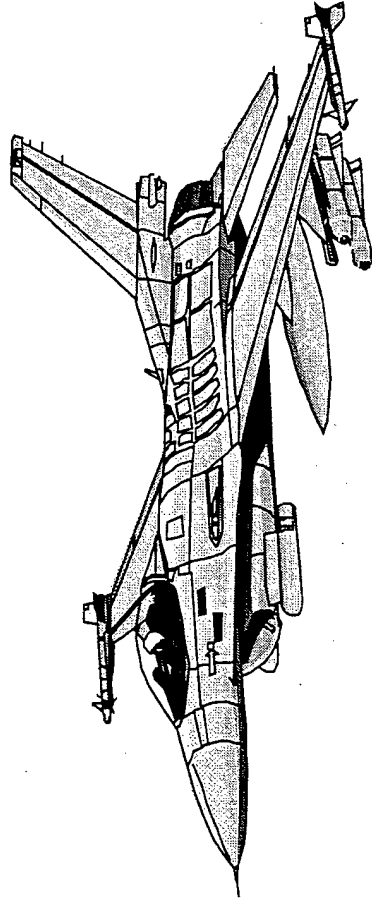


TMR 2001 ppt

EPU Feasibility Assessment



Can IHPRPT Monopropellant Approaches be Modified for EPU's?

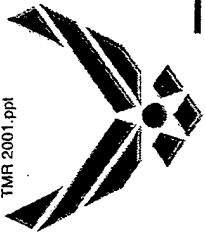


Chronology

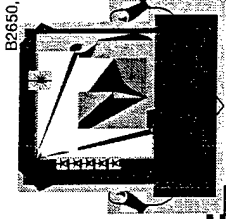
- F-16 and U-2 SPOs direction for program proposal (2000)
- F-16 (ASC/TPV) and U-2 (YPV/RAE) SPOs proposal approval for limited feasibility program (2QFY2001)

Payoff

- Eliminate heavily regulated fuel
- Cut base/depot surveillance costs for F-16 and U-2

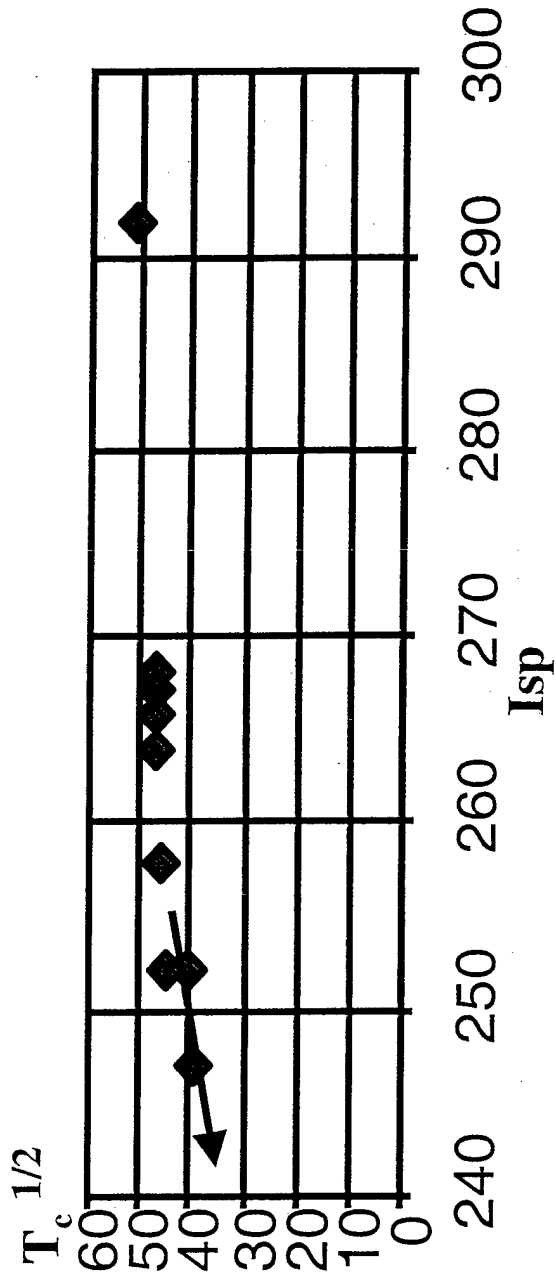


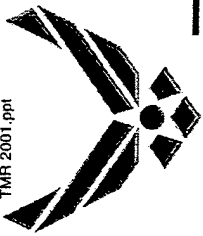
EPU Feasibility Assessment -Project Objectives-



Reformulate Propellants

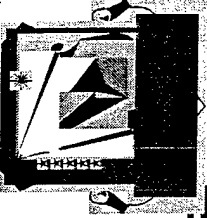
- Determine composition options (ODE-type computation)
- Lower performance/combustion temperature (compatible with Shell 405 catalyst)





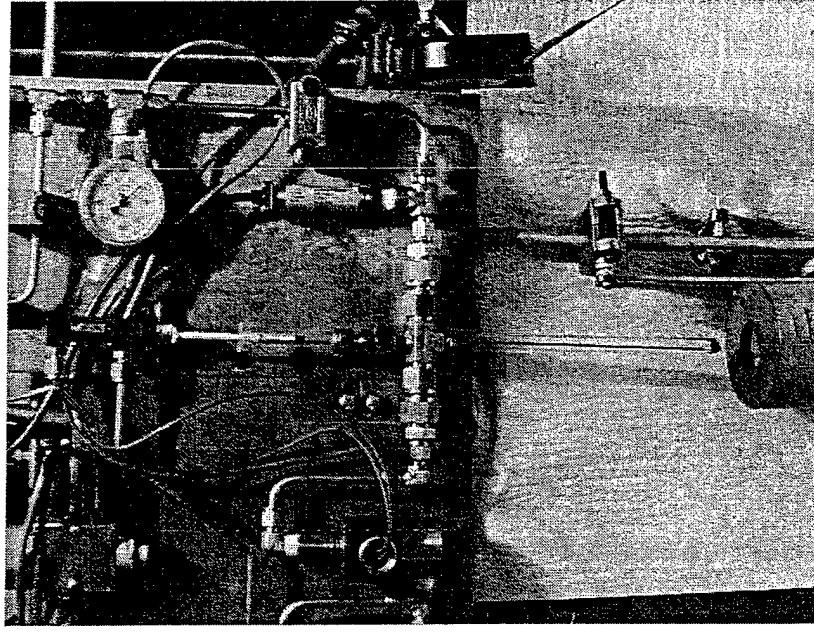
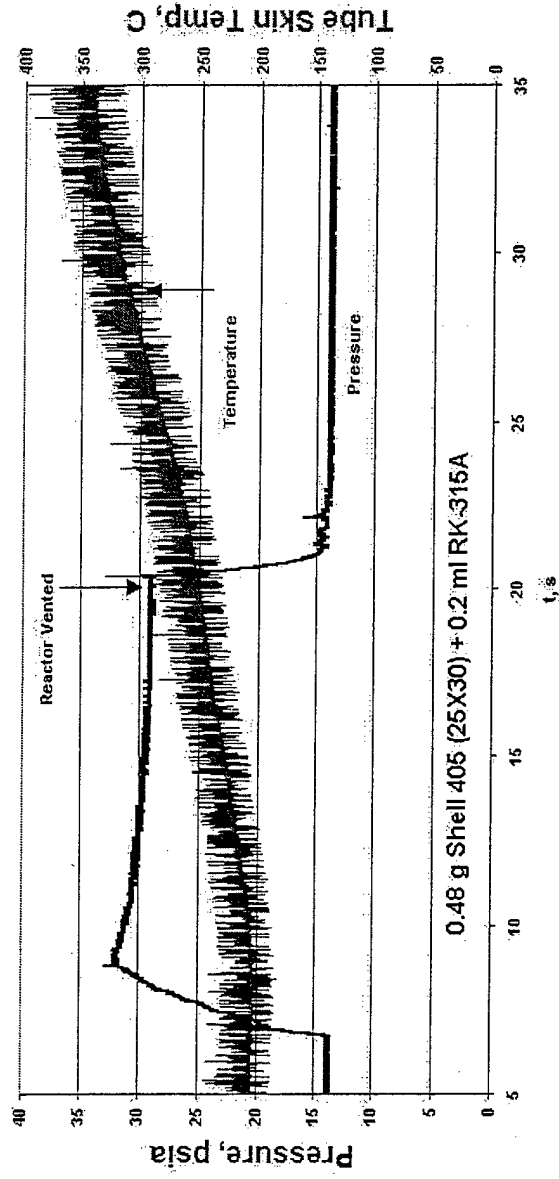
Propellant Ignition Assessment

B2650.



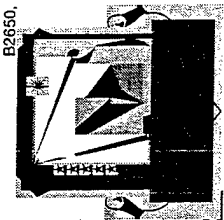
AFRL Pino Test

- Adjustable bed temperature
- Variable pressure capability

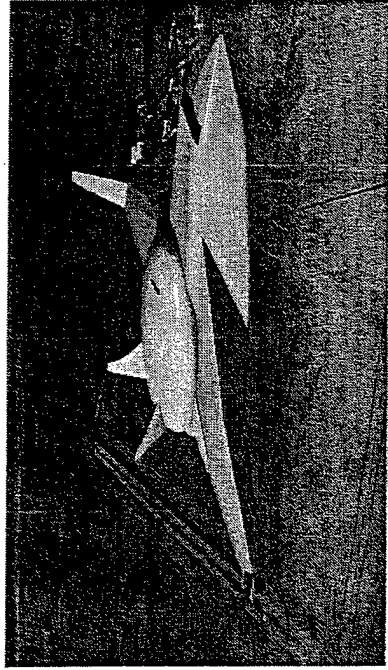




Advanced Monopropellant for Large Launch Vehicles



Can IHPRPT monopropellant be modified for large launch engines?

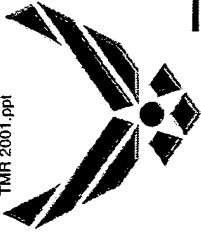


Chronology

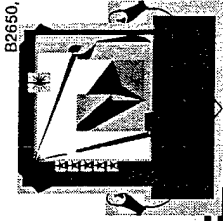
- NASA-MSFC requests proposal for feasibility project (4QFY2000)
- AFRL/PRSP submits proposal (1QFY2001)
- NASA-MSFC approves/funds (3QFY2001)

Payoff

- Single propellant for entire vehicle
- Eliminate cryogenic fuels
- Eliminate one pumping system



Project Objectives



I. Determine necessary monopropellant characteristics

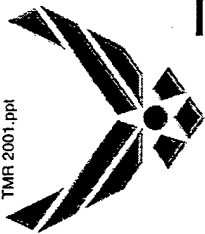
- Identify required performance, safety, hazard, physicochemical properties

II. Determine monopropellant options

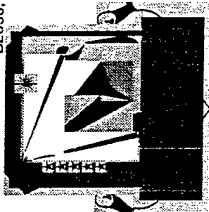
- Focus on new monopropellant class

III. Produce/Characterize a propellant candidate (ca. 50 gram-scale)

- safety/hazards properties/ignition
- physicochemical properties (density, rheology, freezing point...)

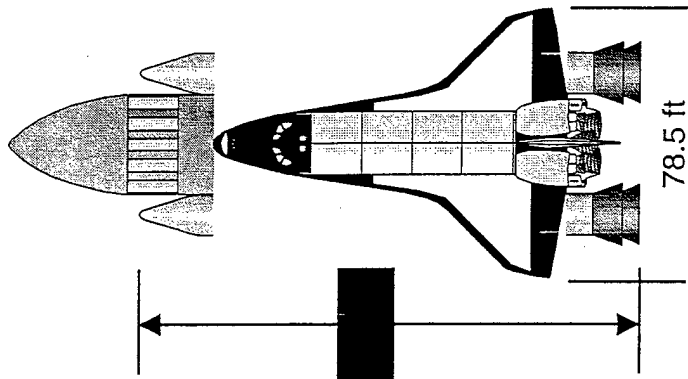


Vehicle System Comparison / Summary

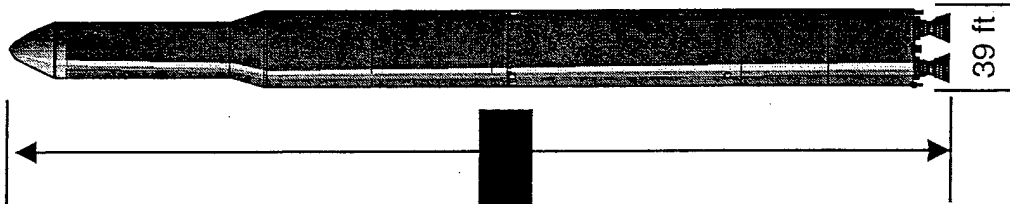


STS (Space Shuttle)

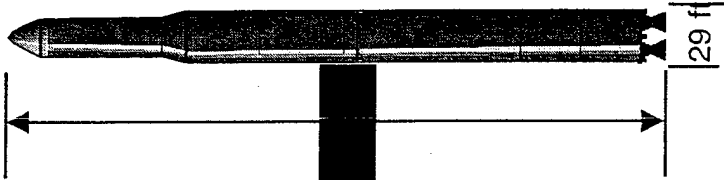
35 Klbm to ISS



Pressure Feed
35 Klbm to ISS
Glow = 14.7 Mlb



Pump Feed
36 Klbm to ISS
Glow = 5.6 Mlb



Pump Feed
High Performance Prop
35.5 Klbm to ISS
Glow = 2 Mlb

